CLAIMS

Having thus described the invention, what is claimed is:

1. An image processing apparatus comprising:

conversion means for altering values of image data so that quantized values will not be changed by errors introduced through a predetermined process;

processing means for performing said predetermined process for said image data; and

quantization means for quantizing said image data for which said predetermined process being performed.

2. The image processing apparatus according to claim 1, wherein said processing means divides said image data to perform an embedding process which embeds embedding data into each of divided image data, said apparatus further comprising detection means for detecting said data being embedded in said divided image data.

3. The image processing apparatus according to claim 1, wherein said conversion means comprises:

format conversion means for changing the form of each pixel included in said image data; and

adjustment means for, based on a quantization value used for said quantization, adjusting said value of said image data whose form has been changed,

wherein the form changing process and the adjustment process are repeated until, for each set of said image data whose form has been changed, quantized values do not change by errors that are introduced through said predetermined process.

4. The image processing apparatus according to claim 1, wherein said processing means performs, as said predetermined process, a process for embedding data in said image data.

5. The image processing apparatus according to claim 4, wherein said processing means comprises:

a hash value calculation means for calculating a hash value based on predetermined key information and said image data; and

embedding means for embedding said hash value in said image data.

6. The image processing apparatus according to claim 4 further comprising detection means for detecting said data that are embedded in said image data.

7. The image processing apparatus according to claim 5 further comprising detection means for detecting said data that are embedded in said image data.

8. The image processing apparatus according to claim 5, further comprising:

inverse quantization means for inversely quantizing image data;

extraction means for extracting a hash value that is embedded in said inversely quantized image data;

calculation means for calculating a hash value based on said image data and said key information that are used for the calculation of said hash value that is extracted; and

alteration detection means for employing said hash value that is extracted and said hash value that is calculated to determine whether said inversely quantized image data have been altered.

9. An image processing method comprising the steps of:

altering the values of image data so that quantized values will not be changed by errors that are introduced through a predetermined process;

performing said predetermined process for said image data; and

quantizing said image data for which said predetermined process being performed.

10. The method according to claim 9, wherein, at said performing said predetermined process, an embedding process is performed and said image data to perform an embedding process which embeds embedding data into each of divided image data, said method further comprising a detection step for detecting said data being embedded in said divided image data.

11. The method according to claim 9, wherein said altering comprises:

a format conversion step of changing the form of each pixel included in said image data; and

an adjustment step of, based on a quantization value used for said quantization, adjusting said value of said image data whose form has been changed,

wherein the form changing process and the adjustment process are repeated until, for each set of said image data whose form has been changed, quantized values are not changed by errors that are introduced through said predetermined process.

12. The method according to claim 9, wherein a process for embedding data in said image data is performed as said predetermined process.

13. The method according to claim 12, wherein said processing step comprises:

a hash value calculation step, of calculating a hash value based on predetermined key information and said image data; and

an embedding step, of embedding said hash value in said image data.

14. The method according to claim 12, further comprising a detection step, of detecting said data that are embedded in said image data.

15. The method according to claim 13, wherein said program further comprises: a detection step, of detecting said data that are embedded in said image data.

16. The method according to claim 13, further comprising:

an inverse quantization step, of inversely quantizing image data;

an extraction step, of extracting a hash value that is embedded in said inversely quantized image data;

a calculation step, of calculating a hash value based on said image data and said key information that are used for the calculation of said hash value that is extracted; and

an alteration detection step, of employing said hash value that is extracted and said hash value that is calculated to determine whether said inversely quantized image data have been altered.

17. A storage medium in which a program is stored that enables a computer to perform the method steps of:

a conversion step, for altering the values of image data so that quantized values will not be changed by errors introduced through a predetermined process;

a processing step, for performing said predetermined

process for said image data; and

a quantization step, for quantizing said image data for which following the performance of said predetermined process.

18. The storage medium according to claim 17, wherein, at said processing step, an embedding process is performed and said image data to perform an embedding process which embeds embedding data into each of divided image data and a detection step is further included for detecting said data being embedded in said divided image data.

19. The storage medium according to claim 17, wherein said conversion step comprises:

a format conversion step of changing the form of each pixel included in said image data; and

an adjustment step of, based on a quantization value used for said quantization, adjusting said value of said image data whose form has been changed,

wherein the form changing process and the adjustment process are repeated until, for each set of said image data whose form has been changed, quantized values are not changed by errors that are introduced through said predetermined process.

20. The storage medium according to claim 17, wherein, at said processing step, a process for embedding data in said image data is performed as said predetermined process.

21. The storage medium according to claim 20, wherein said processing step comprises:

a hash value calculation step, of calculating a hash value based on predetermined key information and said image data; and

an embedding step, of embedding said hash value in said image data.

22. The storage medium according to claim 20, wherein said program further comprises: a detection step, of detecting said data that are embedded in said image data.

23. The storage medium according to claim 21, wherein said program further comprises: a detection step, of detecting said data that are embedded in said image data.

24. The storage medium according to claim 21, wherein said program further comprises:

an inverse quantization step, of inversely quantizing image data;

an extraction step, of extracting a hash value that is embedded in said inversely quantized image data;

a calculation step, of calculating a hash value based on said image data and said key information that are used for the calculation of said hash value that is extracted; and

an alteration detection step, of employing said hash value that is extracted and said hash value that is calculated to determine whether said inversely quantized image data have been altered.